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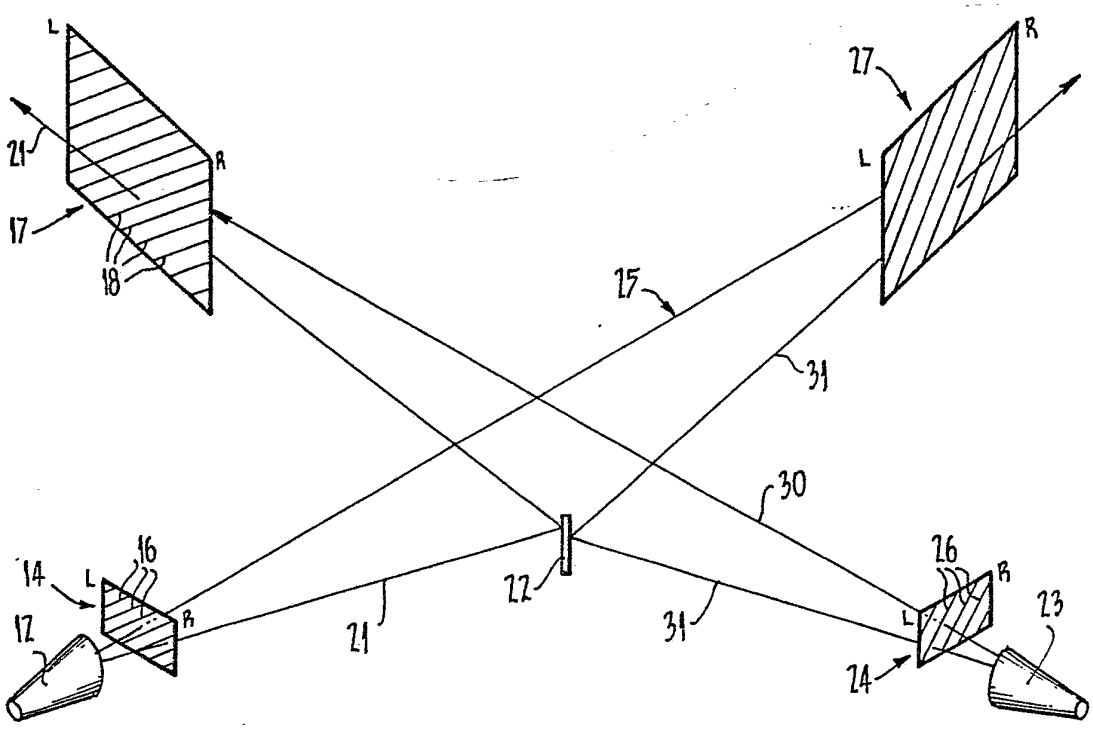

(57) Abstract

An anti-glare system for lighting, particularly for vehicles such as automobiles, using first light polarizing means (14, 24) to polarize in a desired plane (16, 26) the light emitted from vehicle or other lights (12, 23) and second polarizing means (17, 27) having a polarizing plane (18) aligned with that of the first polarizing means (14, 23). The polarizing planes are arranged so that reflected light (21) will pass through the second polarizing means (17), and is thus able to be seen, while polarized light (30) from an opposed light source (23) incident on the second polarizing means (17) is further polarized thus substantially reducing transmission of light therethrough.

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VEHICLE LIGHTING SYSTEM

BACKGROUND OF THE INVENTION

This invention relates to a lighting system for vehicles, particularly road vehicles, but the system according to the invention may be adapted for any other vehicle or device having its own lighting system and/or which is subjected to incident light from lighting systems of other vehicles or light from other sources. For convenience, the system of the invention will be described hereinafter with reference to automobiles.

At the present time, automobiles are provided with headlights which can be switched between "low" beam (sometimes termed "dipped" beam) and "high" beam. On "low" beam, the headlights are intended to be aimed on the roadway some distance in front of the vehicle and various means are employed to direct or mask the low beam light so that it does not shine directly into the eyes of a driver of an oncoming vehicle. The means for maintaining the light in a "low" beam condition include multi-filament bulbs, shielding, relatively movable bulbs, reflectors or lights and, when dual lights are provided, specific aiming.

On "high" beam, the vehicle lights are aimed to direct light well in front of the vehicle such that lights on high beam will shine directly into the eyes of a driver of an oncoming vehicle.

It has long been a problem that the driver of a vehicle can be dazzled or temporarily blinded by lights of an oncoming vehicle which either are switched to high beam or are badly or incorrectly adjusted low beam lights. Such badly adjusted low beam lights may simply be the result of uneven loading of the oncoming vehicle.

Difficulty is also often experienced by drivers dazzled by the lights of oncoming vehicles in adverse weather

conditions, even though the lights may be correctly aimed and on low beam, due to the greater incidence of reflected and refracted light.

It is highly desirable that a vehicle driver can clearly see his path or roadway from the illumination provided by his own headlights, and can clearly see objects illuminated by the headlights and yet is not dazzled or temporarily blinded by the lights of an oncoming vehicle either through those lights being incorrectly switched to high beam or being badly adjusted low beam lights, or due to any other cause such as adverse weather conditions.

It is also desirable to provide means for preventing or, at least, reducing normal headlight glare as seen by the driver of a vehicle.

It is further desirable to provide means for reducing or eliminating headlight glare which means is relatively simple and economical to incorporate on vehicles .

SUMMARY OF THE INVENTION

Means for polarizing light are well known. Such polarizing means are commonly used in scientific instruments and are also commonly used in some forms of glasses, particularly, sunglasses, to reduce glare.

The present invention utilizes in a novel manner the properties of light polarized in a selected plane being able to pass through a polarizing medium aligned with the selected plane but being blocked, or partially blocked by a polarizing medium mis-aligned with the selected plane.

According to one aspect of the invention there is provided first polarizing means to polarize in a predetermined plane the light emitted from a light source on a vehicle, second polarizing means on the vehicle aligned or effectively aligned with said predetermined plane whereby reflected polarized light will pass through said second polarizing means, said predetermined plane being selected such that transmission of the polarized light from the light source through

similarly aligned second polarizing means on an approaching vehicle is at least reduced.

In one arrangement, the first polarizing means to polarize the light emitted from the vehicle light source comprises a polarizing medium which forms part of or is attached to the headlight lenses or covers of the vehicle so that all the light emitted from the vehicle headlights is polarized in the predetermined plane.

The second polarizing means on the vehicle may comprise a polarizing medium on or forming the vehicle windscreen, or may be a visor or the like in the vehicle and which the vehicle driver can move to a position whereat light from an approaching vehicle passes through the visor before reaching the eyes of the driver.

Preferably, the planes of polarization of the first and second polarizing means are aligned and extend at an angle of between 30^{o} and 60^{o}, more preferably 45^{o}, to the horizontal.

It will be seen that the invention, in its preferred aspect, provides polarizing means to polarize the light from a vehicle's headlights in such a manner that the polarized light therefrom can be reflected back through a polarized medium on or adjacent that vehicle's windscreen but the similarly polarized lights from a vehicle facing the opposite direction are effectively polarized in a different plane such that the polarized light from the oncoming vehicle will not pass through the polarized windscreen of the first vehicle, or will pass through at a greatly diminished intensity dependant on the relative angles of the polarizing plane.

According to another aspect of the invention there is provided an anti-glare system for vehicles comprising light polarizing means on or associated with the headlights of vehicles such that the light emitted by such headlights is polarized, cooperating light polarizing means through which light impinging on the vehicle windscreen passes before reaching the eyes of the vehicle driver, the said vehicle light polarizing means and the cooperating light polarizing means being arranged so that reflected polarized light from

each vehicle will pass through the cooperating light polarizing means and can be seen by the driver of that vehicle but polarized light from a vehicle travelling in an opposite direction towards a first vehicle will be further polarized by said cooperating light polarizing means of the first vehicle to be thereby reduced in intensity as seen by the driver of the first vehicle.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a diagrammatic illustration of the polarizing light system of the invention as applied to road vehicles.

DESCRIPTION OF PREFERRED EMBODIMENT

Referring to the drawing, a headlight 12 of a first vehicle emits light which passes through a polarizing medium 14 which may be incorporated in the headlight lens, or may be a cover over the lens, or a polarizing coating on the bulb, lens, reflector or any other means for polarizing the light emitted from the headlight 12. For the purposes of illustration it is considered that the light emitted from the headlight 12 is polarized in a plane extending at an angle of approximately 45^{o} to the horizontal and represented by the lines 16 on the polarizing medium 14. Those lines 16 extend downwardly from right to left as viewed from the headlight side of the medium 14.

A cooperating polarizing means of the first vehicle is represented by 17 which may comprise incorporation of a polarizing medium within the windscreen structure of the vehicle or by coating the windscreen with suitable polarizing material or by a polarizing attachment or accessory mounted adjacent the windscreen either inside or outside the vehicle, such as a flip-down polarized screen similar to or incorporated with a sun visor. The polarizing plane of the cooperating polarizing means 17 is the same as that for the polarizing medium 14 of headlight 12 and is represented by

the lines 18 extending downwardly from right to left as viewed by the vehicle driver.

A beam of light 21 from the headlight 12 passes through the polarizing medium 14 and is polarized thereby in the plane represented by the line 16. The beam 21, on being reflected from an object 22, such as a road surface, passes back to the cooperating means 17, and because the reflected polarized light is in the same plane as the polarizing medium of the means 17 as represented by the lines 18, the reflected beam of light 21 passes through the means 17 to be seen by the driver of the first vehicle. Thus, the driver is able to see reflections from his vehicle's lights and objects illuminated thereby.

The headlight 23 of the second vehicle has its light polarized by a polarizing medium 24 in the same manner as that of the first vehicle. Again, the polarizing medium 24 polarizes the light from the headlight 23 in a plane corresponding to the lines 26 which extend downwardly from right to left in exactly the same manner as for the headlight 12. Thus, the headlights 12 and 23 and the respective polarizing mediums 14 and 24 are identical. Similarly, the cooperating polarizing means 27 of the second vehicle is polarized in the same manner as the means 17 of the first vehicle so that a polarized beam of light 31 from the headlight 23, when reflected by the object 22, passes back through the cooperating polarizing means 27 to be seen by the driver of the second vehicle.

However, when the first and second vehicles are approaching each other, the plane of polarization of a beam of light 25 from headlight 12 is substantially at right angles to the polarizing plane of the cooperating polarizing means 27 so that the polarized light beam 25 will be further polarized by the means 27 thus substantially blocking the transmission of the beam 25. In other words, the cooperating means 27 will polarize the light beam 25 at right angles to its original polarization thereby substantially eliminating light transmission. In a similar manner, a beam of light 30

from the headlight 23 and which is polarized by the polarizing medium 24 in a plane extending at substantially 45° to the horizontal as represented by the lines 26 will be further polarized by the cooperating polarizing means 17 of the approaching other vehicle at an angle substantially at right angles to the initial polarizing plane thereby reducing or substantially eliminating transmitted light through the cooperating polarizing means 17.

The present invention is thereby able, by suitable arrangement of various polarizing mediums, to facilitate at least substantial reduction of light which is able to pass from a vehicle headlight through a windscreen of an oncoming vehicle without reducing to any great extent the reflected light which the driver of the first vehicle would normally see. By appropriately orienting the planes of polarization of the vehicle headlights and the cooperating polarizing means on or adjacent the vehicle windscreen optimum reflected light transmission can be provided with a corresponding selected reduction in transmission of light from the oncoming vehicle. Because the polarizing plane selected would preferably be at an angle of about 45° to the horizontal the effect of polarized sunglasses and the like would be minimal as such glasses generally have a polarizing plane which is substantially horizontal.

The polarizing plane of each light source on each vehicle and of each associated cooperating polarizing means may be the same or may be different to each other. The planes may also be at angles greater or less than 45°. Selection of desired plane angles for each of the light sources and the cooperating polarizing means enables variations to be made to amounts of either or both reflected and directly incident light passing through the cooperating polarizing means. Thus, if the polarizing plane angle for all lights and cooperating means is selected as 40°, all reflected light and a small amount of direct light will pass through the relevant cooperating means.

Further, it will be appreciated that the invention may be used with polarizing mediums which do not fully polarize light in any one plane. In this case, some partially polarized light will pass through the cooperating means irrespective of the relative orientations of the polarizing planes.

As previously indicated, the output light from the vehicle headlights may be polarized by any suitable means such as polarized plastic material or glass in the lens, or a polarizing coating on the lens, or by using polarized headlight protectors which are fitted in front of the normal headlight lens. Alternatively, the headlights may be designed to emit polarized light having the desired characteristics.

In a modification of the invention, instead of providing vehicles with windscreens which are either polarized or have a polarized coating or layer associated therewith, vehicle drivers may wear glasses having lens appropriately polarized to produce the effects of the present invention.

Many other modifications may be made in the design, construction, arrangement or performance of embodiments of the invention, the exact nature and scope of which is defined in the following claims.

Claims

1. A lighting system comprising a light source, first light polarizing means to polarize in a predetermined plane light emitted from the light source, second polarizing means having a polarizing plane aligned or effectively aligned with said predetermined plane whereby reflected polarized light from the light source is able to pass through the said second polarizing means, said predetermined plane being selected so that transmission of said polarized light from the light source through an opposed further second polarizing means is at least substantially reduced.

2. A lighting system according to claim 1 wherein said predetermined plane is approximately 45^{o} to the horizontal.

3. A lighting system according to claim 1 wherein said light source, said first light polarizing means and said second light polarizing means are located on a vehicle.

4. A lighting system according to claim 3 wherein said further second polarizing means is located on a second vehicle.

5. A lighting system according to any one of the preceding claims wherein said first polarizing means comprises a polarizing medium attached to or forming part of the light source.

6. An anti-glare system for vehicles comprising light polarizing means on or associated with the or each vehicle headlight such that the light emitted by such headlights is polarized, cooperating light polarizing means through which light impinging on the vehicle windscreen passes before reaching the eyes of the vehicle driver, the said vehicle light polarizing means and the cooperating light

polarizing means being arranged so that reflected polarized light from each vehicle will pass through the cooperating light polarizing means and can be seen by the driver of that vehicle but polarized light from a vehicle travelling in an opposite direction towards a first vehicle will be further polarized by said cooperating light polarizing means of the first vehicle to be thereby at least reduced in intensity as seen by the driver of the first vehicle.

7. A system according to claim 6 wherein the light emitted by the vehicle headlights is polarized in a plane of between 30^{o} and 60^{o} to horizontal.

8. A system according to claim 6 or claim 7 wherein the light emitted by the vehicle headlights is polarized in a plane extending at about 45^{o} to horizontal.

9. A system according to any one of claims 6 to 8 wherein said cooperating light polarizing means has a polarizing plane substantially aligned with the polarizing plane of the vehicle light polarizing means.

10. A system according to any of claims 6 to 9 wherein said cooperating light polarizing means comprises an adjustable visor in the respective vehicle adapted to be moved to a position between the light source of an opposed vehicle and the driver, said visor comprising or including a light polarizing medium.

11. A system according to any one of claims 6 to 9 wherein said cooperating light polarizing means comprises a polarizing medium formed into or secured to said vehicle windscreen.

12. A system according to any one of claims 6 to 11 wherein said vehicle light polarizing means comprises headlight

covers incorporating a polarizing medium and adapted to be attached to the vehicle headlight(s).

13. A system according to any one of claims 6 to 11 wherein said vehicle light polarizing means comprises a polarizing medium incorporated into or secured to the headlight lens.

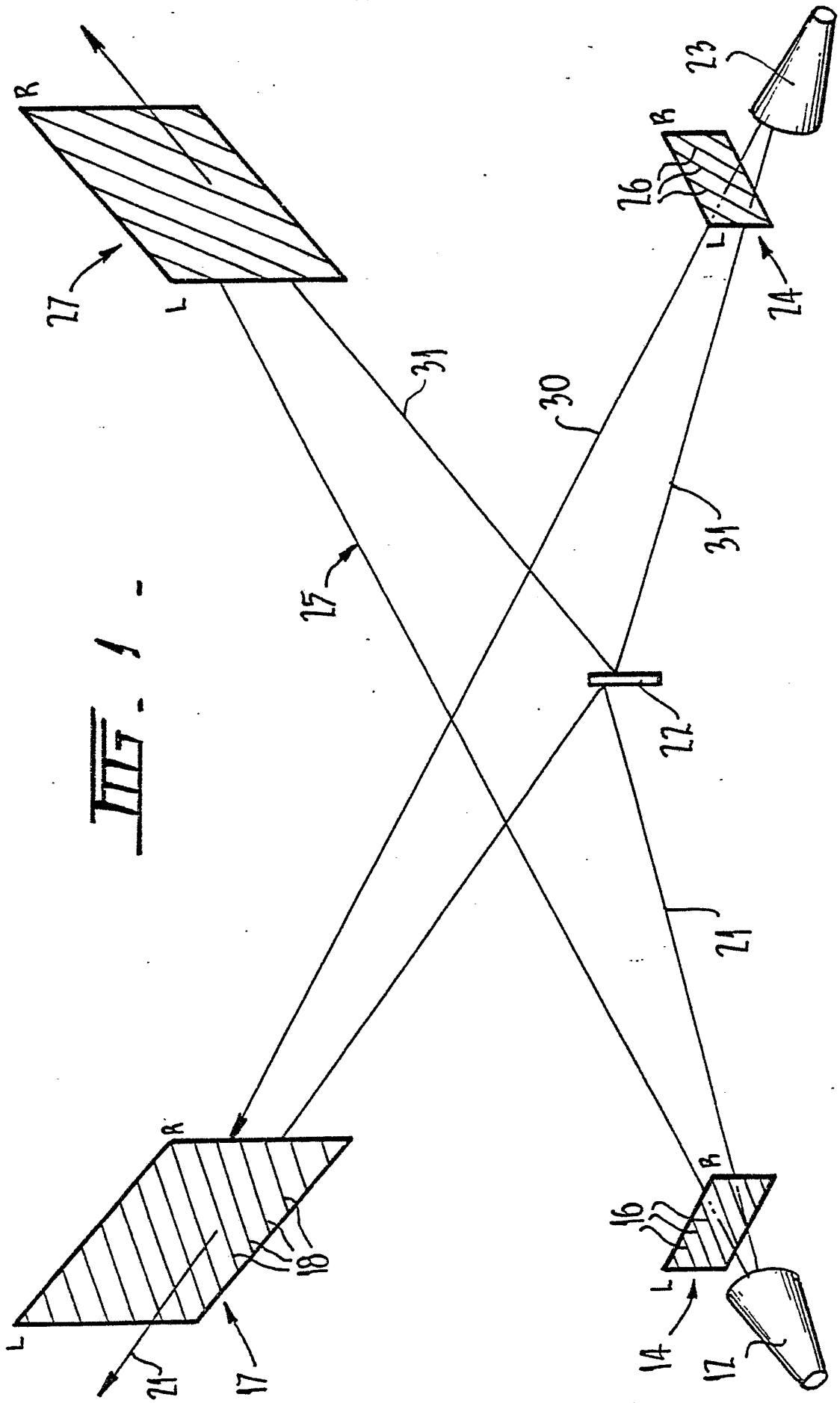

FIG. 1

INTERNATIONAL SEARCH REPORT

International Application No PCT/AU 83/00118

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl.[3] F21M 3/26, F21V 9/14, G01N 21/17, 21/21

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
IPC	F21M 3/26, F21V 9/14, G01N 21/17, 21/21

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

AU: IPC as above, Australian Classification 00.4, 22.51

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category *	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
X,Y	US, A, 2031045 (LAND), 18 February 1936 (18.02.36)	(1-13)
X,Y	AU, B, 46207/59 (237766) (D'ALESSANDRO), 27 August 1959 (27.08.59)	(1-13)
A	AU, B, 43,724/72 (460745) (POLAROID CORPORATION), 3 January 1974 (03.01.74)	(1-13)
A	AU, B, 57,246/60 (261060) (UNITED STATES STEEL CORPORATION), 11 August 1960 (11.08.60)	(1-13)

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IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
21 September 1983 (21.09.83)	29 September 1983 (29-09-83)
International Searching Authority [1]	**Signature of Authorized Officer [20]**
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